

Due largely to the accurate and prompt information which we received daily from your office and Mr. Kimball, of your New York office, we were able to keep the masters of our vessels fully advised of the course this storm was taking, thus enabling them to keep clear of the center of the storm and perhaps preventing the loss of both life and property.

We wish to take this opportunity of expressing to you our thanks for the valued services rendered, which are greatly appreciated.

The highest wind velocities reported from Mexican stations were 60 miles from the northwest at Vera Cruz and 56 miles from the northwest at Puerto Mexico on the 20th. Reports from stations farther east were missing. Advisory warnings in connection with this storm were issued twice daily until the 21st. The radio reports received from ships were invaluable, especially the regular and special reports from the steamers *Zacapa*, *Hibureas*, and *Ceiba*, without which reports it would have been impossible to have reported the course of the storm accurately.

A communication concerning the meteorological conditions in the Canal Zone preceding and during the formation of these two disturbances of the 12th-17th and the 14th-21st, and the uses to which the storm advices were put, has been received from Mr. R. Z. Kirkpatrick, Chief Hydrographer, Canal Zone. The following are extracts from the letter:

Reference is made to the recent predictions on the West Indian hurricanes, which were promptly received by cable and via Swan Island. These messages were broadcast by radio and by notices to mariners, as fast as received here. They were instrumental in causing some of the boats in the New Orleans trade to postpone their sailings for a day or two. So far, not many marine casualties have been reported.

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The few days preceding the appearance of the first disturbance in the Caribbean on the 12th were accompanied by an unusually low barometer on the Canal Zone, the average pressure for the 11th being 29.79 inches. By the 14th this average had increased to 29.87 inches. Southerly winds prevailed from October 8 to 17, inclusive. In the early morning of the 13th a strong wind was experienced on the Pacific coast, attaining a maximum velocity of 36 miles per hour shortly after noon of the same date. An unusual total wind movement of 425 miles was recorded at Balboa Heights on this date, but by midnight the velocity had decreased to 3 miles per hour; then local influences caused a short period of north wind, which later changed to south again at daybreak. This southerly blow, although experienced at Balboa Heights and Cape Mala, was not very pronounced at Cristobal.

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The canal and shipping interests appreciate the prompt service given by the Weather Bureau and the Swan Island radio.

It will be noted that the wind direction and movement were unusual, being from the south from the 8th to the 17th, inclusive. A similar radical departure from the normal wind régime occurred in October, 1921, preceding the formation over the southwestern Caribbean of the hurricane of that month.

In connection with this, reports have come out of the Magdalena Department of Colombia of a storm which swept that region during the 48 hours between October 10 and 11, with great destruction to the banana plantations. The connection between this storm and the disturbance noted over the western Caribbean on the 12th seems obvious.

From the 26th to the 29th, inclusive, advisory warnings were issued daily in connection with a disturbance that appeared south of the Louisiana coast on the morning of the 26th and moved slowly eastward with diminishing intensity and another that moved northward from the central Gulf during the 28th-30th, passing inland on the Mississippi coast on the latter date. Small-craft warnings were displayed from Mobile, Ala., to Cedar Keys, Fla., on the 29th. The highest wind velocity reported was 40 miles an hour from the east at Pensacola, Fla., on the 29th.

Frost warnings were issued for a considerable area in the Washington forecast district on the following dates: 12th, 13th, 17th, 18th, 19th, 20th, 23d, 24th, and 26th. These warnings were well verified, as a rule. No warnings were issued, however, for sections farther south than central Mississippi, northern Alabama, northern Georgia, and South Carolina.—*Chas. L. Mitchell.*

CHICAGO FORECAST DISTRICT.

At the beginning of October killing frost has been experienced over only a few areas in the district, but by the close of the month it had occurred southward almost to the southern limits, the exceptions including southwestern Kansas, southeastern Missouri, extreme southern Illinois, and the region immediately surrounding southern Lake Michigan. Frost warnings were issued from time to time as the occasions seemed to require, and, in the main, and including the more important occurrences, they were verified. The dates on which warnings were disseminated follow: 2d, 4th to 12 inclusive, 14th, 16th to 19th inclusive, and 23d. Those issued on the 11th, 12th, 16th, 17th, and 18th were the most general in both scope and importance. Frost warnings for the Wisconsin cranberry interests were discontinued with those issued on the 2d.

On the Great Lakes the first decade of October was quiet, no winds of storm force occurring. The remainder of the month, however, showed a marked increase in storm activity, especially over the extreme eastern portions of Lakes Erie and Superior and northern Lake Huron. At Buffalo, N. Y., wind velocities of verifying force occurred on five dates and at Alpena, Mich., on four dates.

The first storm warning for the month was issued on the afternoon of the 13th in connection with a disturbance that was moving rapidly eastward over northern Minnesota, southwest warnings being ordered for all upper Lakes stations, excepting Duluth, Minn. Although the disturbance decreased in strength as its center passed eastward immediately north of the upper Lakes, nevertheless verifying velocities occurred over northern Lakes Huron and Michigan and eastern Lake Superior.

On the afternoon of the 16th a weak disturbance of the Alberta type that had reached the Lake region increased considerably in energy, and during the ensuing 24 hours moved rapidly northeastward to the mouth of the St. Lawrence River. Winds of storm force, mostly from the northwest, were attained within the following 36 hours on the eastern shore of Lake Michigan, over the extreme eastern portions of Lakes Erie and Superior, and on Lake Ontario. At the morning observation of the 18th northwest warnings were issued for Lakes Huron and Ontario, eastern Lake Erie, and extreme eastern Lake Superior, but these were lowered a few hours later when it seemed apparent that the gradient was about to decrease rapidly. However, there was a redevelopment over Ontario, Canada, on the night of the 18th-19th that resulted in a maximum velocity of 56 miles an hour from the west at Buffalo, N. Y., on the 19th.

On the morning of the 23d a disturbance of considerable intensity was central north of Lake Ontario. Northwest warnings were issued for Lake Ontario, and southwest warnings for Lake Erie from Dunkirk to Tonawanda, the latter by the Buffalo, N. Y., official. Likewise, the Alpena, Mich., official issued northwest warnings at 10:30 a. m. for the Alpena section of Lake Huron. All these warnings were verified.

On the morning of the 24th a disturbance had reached Manitoba with central pressure of 29.32 inches. In the early afternoon southwest warnings were issued for all upper Lakes station, except northwest at Duluth Minn., and at 4 p. m., for Lake Erie. At 10 p. m. the warnings were extended to Lake Ontario. In general these warnings were verified, but in most cases the wind did not become strong until the center of the depression had passed to the eastward, the winds being from the northwest.

On the morning of the 28th northeast warnings were issued for Lake Superior from Duluth to Munising. The warning was verified at Duluth. A similar warning was ordered for Duluth only on the night of the 29th, but this warning was lowered on the following morning when it had become apparent that the depression over the plains states was decreasing in strength.

Small-craft warnings were advised on the 4th for central and eastern Lake Superior and northern Lake Huron, and were issued by the Houghton official on the 11th and 21st and by the Ludington official on the 24th.

A special week-end forecast for Milwaukee and vicinity, prepared on Thursday mornings, was begun in October. This service is in response to the increasing demand that the regular forecasts be extended, especially to cover the week end, when the forecasts are a matter of much interest to those who take pleasure trips.

A second long-range forecast is also now being prepared for publication in the Wisconsin State Journal at Madison, Wis. This is made on Tuesdays and attempts to cover the conditions expected during the remainder of the week.

Special flying forecasts for zone 4 were sent to Selfridge Field in connection with the aviation meet held on October 13-15 and two special long-range forecasts, covering general weather conditions, were furnished the Detroit office.

The usual temperature forecasts for a week in advance and covering conditions in Montana and North Dakota were begun to the Wenatchee Valley Traffic Association on Monday, October 23. These forecasts were a feature of the work of this office during the last two winters, and are used by the association in connection with their fruit shipments to the East.—*Charles A. Donnel.*

NEW ORLEANS FORECAST DISTRICT.

Northeast storm warnings were displayed, 9 a. m., October 3, from Morgan City to Salmen, La., in connection with a disturbance in the middle Gulf. Small craft warnings were issued for the Texas coast, 9:30 a. m., October 17. Storm warnings were ordered for the Texas coast, Port Arthur to Velasco, and small-craft warnings for the remainder of the Texas coast, 9 a. m., October 23, 1922. Small-craft warnings were ordered, 9:20 a. m., October 25, for the Texas coast. Storm warnings were ordered 12:30 p. m., October 26, for stations at the mouth of the Mississippi River and small-craft warnings for the remainder of the Louisiana coast and the Texas coast, Port Arthur to Galveston. These warnings were generally justified by the subsequent conditions, notwithstanding storm winds did not occur at the stations named. No storm occurred without warnings.

Frost warnings were issued October 7 for the northern portion of Oklahoma and the Texas Panhandle; on the 8th, for northern Oklahoma; on the 10th, for northern Arkansas; on the 11th, for northern Oklahoma and northwestern Arkansas; on the 12th, for northern Arkansas;

on the 17th, for Arkansas, Oklahoma, the northern portion of west Texas, and the northwestern portion of east Texas; on the 18th, for Arkansas and Oklahoma; on the 23d, for Arkansas, Oklahoma, the northern portion of Texas, and northwestern Louisiana; on the 31st, for Oklahoma, west Texas, and the northwest portion of east Texas. These frost warnings were generally verified, and no frost of extent occurred without warnings.

"Norther" warnings were issued for Tampico, Mexico, October 17 and 23.

Fire-weather warnings were issued for Oklahoma, October 16.—*I. M. Cline.*

DENVER FORECAST DISTRICT.

Unusually dry weather, amounting to a drought in large areas, continued in the Denver forecast district during October, and the temperature for the month, as a whole, was considerably above the normal. Low temperatures, with frosts, occurred, however, on several dates. Timely warnings were issued, except for Modena, in extreme southwestern Utah.

The first freezing temperature warnings of the season for places in the fruit valleys in western Colorado were issued on the morning of the 6th. Temperatures as low as 27° were reported on the morning of the 7th in the Gunnison Valley. Warnings of heavy-to-killing frost were issued for Colorado and northern New Mexico on the 7th, with freezing temperature in localities in Colorado and possibly light frost in southeastern New Mexico. Heavy-to-killing frost was reported in northeastern Colorado and freezing temperature occurred in the greater part of the State.

On the 13th a trough of low barometer extended northeastward across Colorado to the Red River Valley of the North, and the barometer was rising in northwestern districts. A freezing-temperature warning for the fruit valleys of western Colorado was issued on the 13th and 14th, and was fully justified. An anticyclonic area from Alberta was moving rapidly southeastward over eastern Montana on the 16th, and the first warning of freezing temperature for eastern Colorado and northern New Mexico was issued on this date. Freezing temperature occurred as forecast, and killing frost, with freezing temperature, was reported on the eastern slope and as far south as Santa Fe. Freezing-temperature warnings were repeated for Colorado and northern New Mexico on the 17th to southeastern New Mexico, and frost was forecast for Utah. Freezing temperature or frost was reported, except in southeastern New Mexico, where a temperature of 36° occurred, with frost. Another trough of low barometer extended from New Mexico northeastward to Minnesota on the 21st, with a well-defined anticyclonic area in the north Pacific States. Freezing temperature or frost warnings were issued for Colorado and northern New Mexico on the 21st and 22d. The warnings were fully justified.

Warnings of freezing temperatures were issued for western Colorado, northwestern New Mexico, and Utah on the 28th. Freezing temperature occurred in localities in the region mentioned, with a temperature of 24° at Santa Fe and Albuquerque, and a killing frost was reported at the latter station. High pressure continued to spread slowly southeastward and the warnings were extended to northeastern Colorado and northern Arizona on the 29th and to southeastern New Mexico on the 30th, with possibly frost in south central Arizona. Temperatures of 20° to 24° occurred in the Gunnison Valley on